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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,809	07/07/2004	Yulun Li	CU-3830 RJS	6988
26530	7590	08/26/2005	EXAMINER	
LADAS & PARRY LLP 224 SOUTH MICHIGAN AVENUE SUITE 1600 CHICAGO, IL 60604			AWAI, ALEXANDRA F	
			ART UNIT	PAPER NUMBER
			3663	

DATE MAILED: 08/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/500,809

Applicant(s)

LI ET AL.

Examiner

Alexandra Awai

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 September 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/12/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-5 are pending and have been examined.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, features, including (but not limited to) the lattice and heat exchanger mentioned in claim 1, must either be shown (and identified) or canceled from the claims. The features or cross-sections indicated by A and B must be explicitly pointed out, particularly because it is not clear that Fig. 2 is a schematic of an entire reactor, as is stated in the specification. In order that the disclosure be enabling, detailed and expanded views of claimed features must be submitted where such is necessary to explain the inventive concept. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

Art Unit: 3663

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

1. The examiner objects to the specification on the grounds that it is not in proper idiomatic English. Compliance with 37 CFR 1.52(a) and (b) is required. Because the written communication of this application is not in proper idiomatic English, it is replete with grammatical errors. These errors include, but are not limited to, the following:

- the misuse or absence of definite and indefinite articles (e.g. page 1, line 21; and page 5, line 18);
- inscrutable diction (e.g. page 2, line 10; page 4, line 4);
- lack of noun-adjective agreement (e.g. page 3, line 3; page 4, line 26)
- punctuation mistakes, such as misplaced commas (e.g. page 2, line 6) and colons that follow dependent clauses (e.g. page 4, line 5).

The substitute specification filed must be accompanied by a statement that it contains no new matter.

2. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms that are not clear, concise and exact (e.g. "DUPTC" page 1, line 23). The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Note that it is appropriate to define the term or terms

Art Unit: 3663

that an acronym abbreviates – unless the abbreviation is standard International Union of Pure and Applied Chemistry (IUPAC) nomenclature – when it is initially used by first introducing the complete term, and then inserting the acronym after it in parentheses.

Claim Objections

3. Where claims 1, 4 and 5 set forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation, 37 CFR 1.75(i). Appropriate correction is required.

4. The use of the trademark CANDU® has been noted in this application. It is a registered trademark of Atomic Energy of Canada Limited (AECL). It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

Art Unit: 3663

art that the inventor(s), at the time the application was filed, had possession of the claimed invention. For instance, it is not clear what is meant by “low-temperature” (claims 1-5). The specification discloses a “low-temperature reactor,” “normal temperature coolant,” and “low-temperature hot water” on page 2, and that calculations show that one of the safety features of devices *like* the present invention is a maximum fuel matrix temperature of 400 °C (page 4). No numerical temperature or range of temperatures is provided for the claimed invention, or any of its components. Additionally, although the specification and claims state that the reactor comprises “control rod,” Fig. 1 clearly shows, and it is well known in the art, that typical reactors comprise a *plurality* of control rods.

7. Claims 4 and 5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claim 4, it is not clear what is meant by “replaces addition of reloading water layer”. This statement might be interpreted as meaning that the canal replaces the water layer, or that the canal’s presence precludes the need for water layer reloading. Claim 5 states that a residual heat cooler and connection tube possessed of an electromagnetic valve constitute a residual heat removal system. However, it is not obviously apparent, nor does the specification describe, what precisely a residual heat cooler is, or how it works – in particular, how it *passively* removes heat. Furthermore, although something that is hot can be cooled, heat itself can only be added or removed, and so a “heat cooler” is necessarily a misnomer.

Art Unit: 3663

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally narrative and indefinite, failing to conform to current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. These errors contribute to many of the specific claim rejections to follow.

There is insufficient antecedent basis for several limitations in claims 1-5. For example, the terms “core”, “lattice” and “core vessel”, among others, are preceded by definite articles without first being submitted as features that comprise the invention (claim 1). Additionally, “core pool” (claim 2), “core outlet” (claim 3), “spent fuel storage pond” (claim 4) and “passive residual heat removal system”, “residual heat cooler” and “connection tube” (claim 5) lack proper antecedent basis. The preceding is not to be considered an exhaustive listing of anomalous terms.

Regarding claim 1, it is not clear what is meant by the term “NPP”, and although it is initially stated that the core comprises a single “fuel assembly”, applicant thereafter refers to a plurality of fuel assemblies in definite terms. The phrase “at least” renders claim 2 indefinite because it is unclear whether, or to what degree, the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Claim 3 is indefinite for stating that a pressurizer is provided “on the coolant inlet nozzle”, and claim 5 is indefinite for stating that the

Art Unit: 3663

electromagnetic valve is “*on* the connection tube” (emphasis added). The structural relationships conveyed in claims 3 and 5 are unclear, and are not described in the specification.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

11. Claims 1 and 3 are rejected under 35 U.S.C. 102(a) as being anticipated by Greul (DE 3718510A). Greul discloses a reactor that operates at low temperature and utilizes spent fuel, such as that from a light water reactor (see English language abstract).

The Greul invention clearly draws upon CANada Deuterium Uranium (CANDU®) technology, which is commonly understood within the relevant art, as the CANDU® reactor was designed in the 1960's. The CANDU® reactor type operates at relatively low temperature and utilizes pressurized coolant as well as unenriched uranium oxide or mixed oxide fuel (i.e. spent fuel). It is conventional in the art for a pressurized-coolant nuclear reactor to comprise a fuel assembly, upper and lower core grid plates, control rods and their drive mechanisms, a pressurizer, a core within a core vessel, and coolant inlet and outlet nozzles. These components, with the exception of the pressurizer, were present in some form in the Fermi/Szilárd Neutronic Reactor, patented in 1955 (2,714,577). The use of a secondary reference in connection with a 35 U.S.C. 102 rejection is proper when the secondary reference is cited to show that the primary reference contains an “enabling disclosure”. See MPEP § 2131.01. In this case, the secondary

Art Unit: 3663

reference gives evidence proving the conventionality, and in most cases, the *necessity* of the listed components in the typical nuclear reactor. It is therefore inherent to the Greul invention, and to various CANDU®-type reactors, that they may be constructed as is broadly set forth by the applicant in claims 1 and 3.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greul as applied to claims 1 and 3, and further in view of Gou *et al* (5,577,085).

Greul does not explicitly teach the use of a sealing cover or airtight shield as a gas shield for a core pool. Gou *et al* (Fig. 1) disclose steel domes (articles 6 and 12) over the containment, which comprises a core pool, for the purpose of containing gases within the pressure vessel. It

Art Unit: 3663

would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to implement Gou *et al*'s steel dome or domes in order to prevent leakage of radioactive or otherwise harmful gases from the core pool of the reactor type disclosed by Greul.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greul as applied to claims 1 and 3, and further in view of Newton *et al* (5,268,942) and Dickson (3,309,278).

Greul does not teach the use of a passive residual heat removal system that is coupled to a spent fuel pool, as is claimed in the present invention. However, Newton *et al* disclose a spent fuel pool cooling system comprising a residual heat removal system and a spent fuel pool (Abstract). Dickson discloses a solenoid-driven valve (column 4, line 2) that is opened during a loss of power event. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the fluid connections of the Newton *et al* invention to operate by an electromagnetic mechanism, as in the Dickson invention, and to incorporate the resulting passive heat removal system into the reactor disclosed by Greul. Furthermore, passive heat removal systems fluidly connected to core pools or spent fuel pools are conventional within the art, and they typically comprise tubes and valves – electromagnetic valves having been used since the 1960's, as shown by Dickson.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Art Unit: 3663

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexandra Awai whose telephone number is (517) 272-3079.


The examiner can normally be reached on 8:30-5:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AA

August 23, 2005


JACK KEITH
PRIMARY EXAMINER
505 3663